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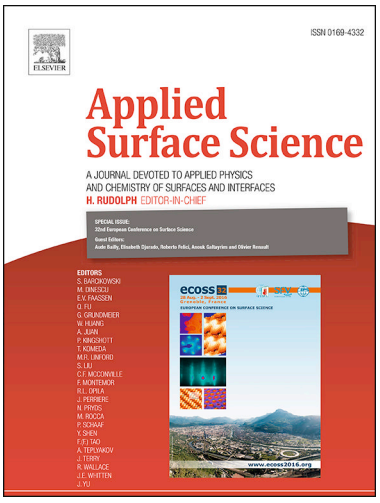

Full Length Article

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Catalyst-coated microchannel reactor via chemical bath deposition for biodiesel application

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Abstract

This work involved the application of chemical bath deposition (CBD) technique for coating tin oxide on the microchannel surfaces for biodiesel application. The influence of surface pretreatment method on the surface properties was studied. After that, the influence of CBD variables on catalyst surface amount was investigated through the most suitable surface pretreatment method. The optimal CBD conditions were found as follows: $SnCl_4 \cdot 5H_2O$ concentration of 0.48 M, deposition period of 24 h and deposition temperature of 80 ^oC. The CBD process was also applied with EDTA and stirring to improve the catalyst surface content of SnO_2/γ-Fe_2O_3 up to 34%. The reaction performance was tested for biodiesel synthesis under the supercritical ethanol. The ethyl ester content of 90.1% was achieved under the reaction temperature of 300 ^oC, residence time of 10 min, ethanol-to-oil molar ratio of 30:1, and operating pressure of 7.5 MPa. The lower requirement of ethanol-to-oil molar ratio and operating pressure were distinctly observed when compared with the literature data.